Framework for Measuring the Quality of Software Specification

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***Abstract*—This paper proposes a platform for measuring the quality of structure and functional requirement in software requirement specification (SRS). The SRS contains information needed to ensure the quality of the software. Measurement will be proposed based on four quality properties namely preciseness, consistency, completeness and correctness. The completeness properties will be used to measure the SRS which is based on IEEE 830 as a minimal standard. Meanwhile, the consistency, correctness and preciseness properties are proposed to be used for measuring the functional requirement in the document. The measurement of the overall quality of the SRS will be calculated based on all quality properties. The rules and formula for computing the SRS quality are embedded in proposed framework., which is a basis for platform for assessing the software quality.**

***Index Terms*—Formal Specification; Qualitative Measurement; Software Quality; Software Requirement Specification.**

I. INTRODUCTION

The requirement is the first stage of software development project and known that the successfulness of software development depending on the quality of the SRS. Survey on Requirement Engineering practice and its critical problem shown that hidden or incomplete requirement is the main cause of project failure [1].

The study on problem solution for software specification assessment has contributed toward the successfulness of the development. According to D.M. Fernandez *et. al.* (2015) [1], 45% of respondent agreed toward implementation of the standard guideline; whereas 44% of respondent agreed on the clear role and responsibilities that needs to be carried out through the development.

SRS consists of properties needed to develop the system. The collected requirement in natural language may cause ambiguity due to the difference interpretation by developer. There are various studies had been done to overcome the ambiguity of natural language [16, 19]. Due to the focus on the natural language analysis, quality of the requirement can be assessed by formalizing the requirement.

This paper proposed the quantitative measurement of the quality of heterogeneous SRS. The study is focused on four quality properties that can be assessed as early as requirements documentation stage, which were preciseness, correctness, consistency and completeness. The study is divided into two categories namely the structure of the document and the functional requirement. The completeness properties will be assessed based on document's structure and correctness, consistency and preciseness will be assessed based on the functional requirement.

II. RELATED WORK

Variety of domain in software development is one of the factors affect the software quality [24]. Each domain may have their own focus quality properties. Even if the focused quality properties are difference between each domain, a standard had been implemented to standardize the SRS [11, 21]. Research had been done in automotive industry show that this standard is not enough to show a complete structure for this domain [17]. Additional quality properties may have to be implemented to accommodate required domain. But according to A. Takoshima *et. al.* (2015) [17], the implemented standard may become a minimal requirement that every SRS should follow.

Commonly software quality is grouped as a non-functional requirement for a software project. A comprehensive study had been done between software quality model namely McCall model, Boehm model, Dromey model and ISO 9126 [6]. Improvements in the model increase the understanding of the quality to be assessed. A lot of difference approaches had been done to overcome the crisis regarding the software quality [7, 8, 9]. Conversion between the requirement phase to the design phase is crucial because the functionality must be precise, consistent and correct. The capability to trace the function in the design and validate it with the requirement specification must be done to ensure the consistency. That validation shows the degree of correctness of developed design. To ensure the level of satisfaction by the client, those functional requirements must be stated in precise without any vague details [3].

A summary of techniques had been done using a qualitative approach [2, 22]. Since the requirement specification is written in natural language, it had caused a blooming in research to overcome its ambiguity [2, 5, 15, 16, 17, 22]. The concern of the research is due to the conflict interpretation of the functional requirement between different levels of stakeholder. The processes of validation and verification are time consumption and need commitment from the client. Most of the studies focus on the consistency of the term used in the requirement phase and compared it with the later phase of development. By assessing the term, traceability between the requirement phases with another phase can be easily done. In this proposed research, the formalization of quantitative measurement in SRS helps in term of measuring the document by concentrating on the structural and functional requirement in the SRS.

Several studies were done on the software requirement structure [5, 12, 13, 14, 15] whereby the standard requirement for the structure should be met [11, 17, 21]. An ontology approach had been proposed by researchers to ensure the completeness properties of the structure [12, 13, 17]. All the implemented structures are based on the standard in IEEE 830 [22] as it inherits almost similar structure with IEEE 29148